

DETAILED ACTION

Applicant's amendment filed with the arguments on 02/29/2008 has been entered. Claim 1 was amended. Claims 4-7 cancelled. Claims 1-3 and 8-29 are currently pending with the application. Claims 2-3 and 17-29 were withdrawn from consideration due to the earlier restriction requirement. Claims 1 and 8-16 are currently being prosecuted.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 1 and 8-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaki et al (JP 2000-297303) in view of Omoya et al (US 6,139,777).

Sasaki et al teach the composition of a conductive paint comprising a dispersion of conductive particles in a thermosetting binder such as alkyd of phenol resins and a solvent. The conductive particles included approximately spherical metal particles such as Ag, Cu, Ni, Pd and their alloys with a particle size regulated to ≤ 1.0 micron and/or agglomerates close to the primary particles (Abstract, Fig-c; Claims 3

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and 5-6, Para 0012-0013, 0031, 0035, 0052). The degree of agglomeration will be obvious over the flock (aggregate) containing two primary particles and degree of agglomeration for agglomerates with size close to primary particle lie will be about 1 that lies close to the low range of 1.05, and Similarly, a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. Titanium Metals Corp. of America v. Banner, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) (Court held as proper a rejection of a claim directed to an alloy of "having 0.8% nickel, 0.3% molybdenum, up to 0.1% iron, balance titanium" as obvious over a reference disclosing alloys of 0.75% nickel, 0.25% molybdenum, balance titanium and 0.94% nickel, 0.31% molybdenum, balance titanium.

The prior art fails to teach the ratio of the conductive fillers to the resin binder in the composition and specific surface area of the particles per claim-1, properties per claims 8-10, specific resin components per claims 11-12 and specific conductive fillers per claims 15-16.

In the analogous art, Omoya et al teach the composition of a conductive paste with low viscosity and improved resistance to humidity comprising: (a). Conductive particles such as copper with an average diameter of 0.5-20 micron and a specific surface area of 0.05-1.5 m²/g and/or conductive particles containing conductive or non-conductive core particles coated with metals such as Ag and Ag-alloys wherein the surface oxygen concentration was less than 1.0 wt% (Cl-3, Ln 1-19), and (b). 70-30 vol% resin such as epoxy (Abstract). The prior art further teaches using dimer acid glycidyl esters with amine adduct hardeners in the composition to benefit from low viscosity (Cl-3, Ln 1-19, Cl-11, Ln 30-36; Cl-13, Ln 34-38) and making the composition in a three-roll-mill (Abstract, Cl-20, Exmpl-5).

With regard to claim-1, it would have been obvious to a person of ordinary skilled in the art to combine the prior art teachings to formulate the conductive paste containing 30-70 vol% resin per the teachings of Omoya et al with reasonable expectation of success, because the combined prior art teaching is suggestive of the claimed composition and the teachings are in the analogous art of conductive pastes/paints. The instant claimed surface area will be obvious because the prior art particle size of the conductive particles is similar in size and shape to that claimed by the applicants. With regard to the product by process limitation in claim-1, the prior art product is either same or substantially same as

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that claimed by the applicants, and When the reference teaches a product that appears to be the same as, or an obvious variant of, the product set forth in a product-by-process claim although produced by a different process, the claim is not patentable. See *In re Marosi*, 710 F.2d 799, 218 USPQ 289 (Fed. Cir. 1983) And *In re Thorpe*, 777 F.2d 695, 227 USPQ 964 (Fed. Cir. 1985). See also MPEP §2113.

With regard to claim 8, the combined prior art paste composition and components used in making the paste are similar to that by the applicants and similar compositions are expected to possess similar properties. This is further substantiated by the disclosure of Kawakita et al (US 5,652,042) that show a volatile content of less than 0.4 wt% for conductive pastes containing silver particles in bisphenol-F type and glycidyl ester type resins (CI-11, Table-2).

With regard to claim 9, the combined prior art teaches conductive particles such as Cu, Ag and Au and their alloys, wherein the prior art composition is similar to that by the applicants and similar compositions are expected to possess similar properties.

With regard to claim-10, the combined prior art teaches conductive particles such as Cu, Ag and Au and their alloys with a surface oxygen content is less than 1 wt% (CI-3, Ln 1-19).

With regard to claims 11-12, it would have been obvious to a person of ordinary skilled in the art to substitute the resins/binders in the composition of Sasaki with glycidyl ester epoxies including dimer acid glycidyl esters (CI-8, Ln 65 to CI-9, Ln 10; CI-11, Ln 30-36) with amine adduct hardeners (CI-13, Ln 34-38) of Omoya et al as functional equivalents with reasonable expectation of success, because Sasaki et al teach the use of thermosetting resins, and further disclose that the composition is not limited to the disclosure.

With regard to claims 13-14, the prior art teaches the conductive particles comprising Ag, Au, Ni and Pd and/or their alloys (Para 0052).

With regard to claims 15-16, it would have been obvious to a person of ordinary skilled in the art to substitute the conductive fillers of Sasaki et al with conductive particles containing conductive or non-conductive core particles coated with metals such as Ag and Ag- alloys of Omoya et al as functional equivalents with reasonable expectation of success, because the combined prior art teaching is suggestive of the claimed composition.

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2. Claims 1, 8-10 and 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaki et al (JP 2000-297303) in view of Yamamoto et al (US 4,859,364).

Sasaki et al teach the composition of a conductive paint comprising a dispersion of conductive particles in a thermosetting binder such as alkylid of phenol resins and a solvent. The conductive particles included approximately spherical metal particles such as Ag, Cu, Ni, Pd and their alloys with a particle size regulated to ≤ 1.0 micron and/or agglomerates close to the primary particles (Abstract, Fig-c; Claims 3 and 5-6, Para 0012-0013, 0031, 0035, 0052). The degree of agglomeration will be obvious over the flock (aggregate) containing two primary particles.

The prior art fails to teach the ratio of the conductive fillers to the resin binder in the composition and specific surface area of the particles per claim-1, properties per claims 8-10 and specific conductive fillers per claims 15-16.

In the analogous art, Yamamoto et al teach the composition of a conductive paste comprising a dispersion of conductive particles comprising (a) conductive metal particles having an average particle size of 0.3-1.0 micron and (b) particles uniformly coated with conductive metal and having a particle size of not more than 1.0 micron in an organic medium comprising a resin such as phenolic resin <thermoset> and a solvent. The ratio of organic medium to the solids was in the range of 60-90 wt% solids and 40-10 wt% organic medium (Abstract, Cl-3, Ln 58; Cl-4, Ln 56-64). The conductive particles (a) were metals such as Pd, Ag, Pt and their alloys wherein the particle size ranged from 0.3-1.0 micron with good sphericity and uniformity, and particles agglomerated to a size of 1.0 micron or more that meets the limitation of degree of agglomeration in the claims ($1.0 \text{ micron aggregate} / 0.3 \text{ micron particle} = 3.33$ of degree of agglomeration). The conductive particles (b) included cores of TiO_2 , BaTiO_3 , Al_2O_3 , SiO_2 , and glass or like coated with metal such as Pd, Ag, Pt or their alloys, and having a particle size of less than a micron (Cl-1, Ln 61 to Cl-2, Ln 68). The wt% of the components when computed as vol% will meet the ratio limitations in the instant claims.

With regard to claim-1, it would have been obvious to a person of ordinary skilled in the art to combine the prior art teachings to formulate the conductive paste containing 60-90 wt% solids and 40-10 wt% organic medium per the teachings of Yamamoto et al with reasonable expectation of success,

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because the combined prior art teaching is suggestive of the claimed composition and have common utility in forming electrodes. The instant claimed surface area will be obvious because the prior art particle size of the conductive particles is similar in size and shape to that claimed by the applicants. With regard to the product by process limitation in claim-1, the prior art product is either same or substantially same as that claimed by the applicants, and When the reference teaches a product that appears to be the same as, or an obvious variant of, the product set forth in a product-by-process claim although produced by a different process, the claim is not patentable. See *In re Marosi*, 710 F.2d 799, 218 USPQ 289 (Fed. Cir. 1983) And *In re Thorpe*, 777 F.2d 695, 227 USPQ 964 (Fed. Cir. 1985). See also MPEP §2113.

With regard to claim 8, the combined prior art paste composition and components used in making the paste are similar to that by the applicants and similar compositions are expected to possess similar properties. This is further substantiated by the disclosure of Kawakita et al (US 5,652,042) that show a volatile content of less than 0.4 wt% for conductive pastes containing silver particles in bisphenol-F type and glycidyl ester type resins (CI-11, Table-2).

With regard to claims 9-10, the prior art teaches conductive particles such as Ag, Cu, Ni, Pd and their alloys, wherein the prior art composition is similar to that by the applicants and similar compositions are expected to possess similar properties.

With regard to claims 13-14, the prior art teaches the conductive particles comprising Ag, Au, Ni and Pd and/or their alloys (Para 0052).

With regard to claims 15-16, it would have been obvious to a person of ordinary skilled in the art to substitute the conductive fillers of Sasaki et al with conductive particles containing core particles coated with metals such as Ag, Pd and Ag/Pd- alloys of Yamamoto et al as functional equivalents with reasonable expectation of success, because the combined prior art teaching is suggestive of the claimed composition.

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3. Claims 1, 8-10 and 13 are rejected under 35 U.S.C. 103(a) as being obvious over Koji et al (JP 09-194768).

Koji et al teach the composition of a conductive paste comprising (A) an electroconductive powder of silver particles of 1-20 micron <agglomerate> prepared by three-dimensionally agglomerating primary silver particles with a primary particle size of 0.1-5 micron, (B) a binder of polyester, (C) a curing agent and (D) a solvent, wherein the weight ratio of A/(B+C) and B/C were set to 60/40-95/5 and 50/50-99/1 respectively (Abstract). The silver granule (Spherical) had a surface area of 1.0-2.5 m²/g (P-0012). The copolymerized polyester (B) comprising an aromatic dicarboxylic acid, alkylene glycol and caprolactone and hardened with isocyanate (C) including epoxies meets the limitation of a thermosetting resin in the claim-1 (P-0015-0029).

The prior art is silent about the degree of agglomeration of the silver/conductive particles and component ratios as volume % per claim-1, the properties of silver/metal per claims 1 and 9-10, and property of binder per claim-8.

The particle size of the particle (A) and its surface area overlaps with the instant claimed range in claim-1. The degree of agglomeration when calculated based on the prior art agglomerate and primary particle size will overlap with the instant claimed range in claim-1, and In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). The prior art wt ratios of conductive particle to binder will overlap over the instant claimed ratios as Vol%.

With regard to claim 8, the combined prior art paste composition and components used in making the paste are similar to that by the applicants and similar compositions are expected to possess similar properties.

With regard to claims 9-10 and 13, the prior art teaches conductive particles such as Ag, Cu, Ni, Al and In, wherein the prior art composition is similar to that by the applicants and similar compositions are expected to possess similar properties.

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4. Claims 11-12 and 14-16 are rejected under 35 U.S.C. 103(a) as being obvious over Koji et al (JP 09-194768) in view of Omoya et al (US 6,139,777).

The disclosure on the composition of conductive paste as set forth in rejection-3 under 35 USC 103(a) is herein incorporated.

The prior art is silent about the specific resin per claims 11-12, and the conductive particles comprising alloys per claim-14, and metal/alloy coated conductive or non-conductive core particles per claims 15-16.

In the analogous art, Omoya et al teach the composition of a conductive paste for via filling and circuit boards, with low viscosity and improved resistance to humidity comprising: (a). Conductive particles such as copper with an average diameter of 0.5-20 micron and a specific surface area of 0.05-1.5 m²/g and/or conductive particles containing conductive or non-conductive core particles coated with metals such as Ag and Ag- alloys wherein the surface oxygen concentration was less than 1.0 wt% (Cl-3, Ln 1-19), and (b). 70-30 vol% resin such as epoxy (Abstract). The prior art further teaches using dimer acid glycidyl esters with amine adduct hardeners in the composition to benefit from low viscosity (Cl-3, Ln 1-19, Cl-11, Ln 30-36; Cl-13, Ln 34-38) and making the composition in a three-roll-mill (Abstract, Cl-20, Examp1-5).

With regard to claims 11-12, It would be obvious to a person of ordinary skill in the art to combine the prior art teachings to substitute the resin and hardener in the paste composition of Koji with the dimer acid glycidyl esters and amine adduct hardeners of Omoya as functional equivalents to benefit from low viscosity with reasonable expectation of success, because Koji desires the use of epoxies in the composition and is concerned about low viscosity (P-0058) for printing the composition (P-0009) and Omoya et al is suggestive of using the composition by printing methods (Cl-1, Ln 45-46), and have a common utility for use in circuit boards (Abstract: Koji; Omaoya: Abstract).

With regard to claims 14-16, It would be obvious to a person of ordinary skill in the art to combine the prior art teachings to substitute the conductive fillers in the paste composition of Koji with the conductive fillers of Omoya et al as functional equivalents with reasonable expectation of success

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because the teachings are in the analogous art and have a common utility for use in circuit boards (Abstract: Koji; Omoya: Abstract).

Response to Arguments

Applicants arguments filed 08/17/2007 have been fully considered and they overcome the rejections over Durand et al (US - 5,180,523) and Yamamoto et al (US 4,859,364) cited in the last office action. The degree of aggregation of Particulate-B/aggregates in prior art by Durand could not be established. The rejection of claims over Sasaki et al (JP 2000-297303) have been maintained for the reasons set forth in the last office action.

For the reasons set forth above, applicants fail to patentably distinguish their product by process over the art products.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KALLAMBELLA VIJAYAKUMAR whose telephone number is (571)272-1324. The examiner can normally be reached on M-F 07-3.30.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on 5712721358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KMV/
June 06, 2008.

/Stanley Silverman/
Supervisory Patent Examiner, Art Unit 1793